Highway Traffic Noise Assessment Summary

Prepared for:

State of Alaska
Department of Transportation and
Public Facilities

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Executive Summary

The Alaska Department of Transportation and Public Facilities (ADOT&PF) proposes to improve traffic movement through the Sterling Highway corridor between Mileposts 45 and 60. Three build alternatives are being considered, as well as a no build option. This highway traffic noise assessment evaluates the potential for traffic noise impacts, and noise mitigation options in accordance with the ADOT&PF Noise Abatement Policy.

Traffic noise levels were measured at eleven representative locations in the project area. Vehicle counts and classifications were performed for use in modeling future traffic noise levels. The Federal Highway Administration (FHWA) Traffic Noise Model version 2.5 (TNM) was used to evaluate future noise levels under the three build and the No Build alternatives. This traffic noise analysis conformed to FHWA and ADOT&PF traffic noise analysis guidelines and requirements. TNM was used in a screening analysis to identify noise-sensitive receptors in the study area. TNM was then used to evaluate the potential for traffic noise impacts associated with each of the proposed alternatives.

Evaluation of the three build alternatives yielded a total of two noise impacts to commercial receptors and ten noise impacts to residential receptors under the Cooper Creek Alternative, two residential noise impacts under the G South Alternative and one residential noise impact under the Juneau Creek Alternative. A total of one receptor for the Juneau Creek, two receptors for the G South and five receptors for the Cooper Creek alternatives were found to require consideration of noise mitigation. Noise abatement options for the impacted receptors were evaluated. No reasonable and feasible mitigation options were available for the noise impacts under any of the alternatives. Consequently, no noise abatement is proposed as a part of the project.

This recommendation is based upon preliminary design information and existing policies. The recommendations will be re-evaluated during the design phase of the project to determine if they remain valid.

1.0 Introduction

The Sterling Highway connects the western Kenai Peninsula to the rest of Alaska and the Alaska Department of Transportation and Public Facilities (ADOT&PF) has recognized the need to resolve several interrelated problems:

- The highway's capacity is not adequate to accommodate through traffic.
- Physical highway design features to not conform to "Rural Principal Arterial" standards.
- System linkage between urban areas and other highways is poor.
- Local traffic cannot efficiently move on and off the highway.

The project purpose is to resolve these problems, thereby reducing congestion and providing for more consistent flow of traffic at typical highway speeds, while also accommodating the sizable minority of traffic bound for local destinations.

1.1 Project Alternatives

Four alternatives are being evaluated as part of the Supplemental Draft Environmental Impact Statement (SDEIS) currently under preparation. Each alternative begins at the intersection of Quartz Creek Road with the Sterling Highway, at MP 45, and ends just east of the highway's intersection with Skilak Lake Road, at MP 58. A brief description of each alternative is presented below.

1.1.1 No Build Alternative

The No Build Alternative will not change the existing highway in the project area. The existing highway has one lane in each direction, limited shoulder space, tight curves, low sight distance, and a posted speed limit of 35 miles per hour (mph) in areas. Although normal highway maintenance would continue along this segment of roadway, no improvements would occur. The existing bridges along the Sterling Highway will be replaced as part of the normal bridge replacement program, but would not be conducted as part of this project.

1.1.2 Cooper Creek Alternative

The Cooper Creek Alternative follows the existing Sterling Highway from MP 45 to the south side of the Cooper Landing Bridge, where it turns south from the existing highway and climbs the hillside to a maximum elevation of approximately 275 feet above the Kenai River. The alignment traverses the hillside before descending to cross Cooper Creek with an 846-foot-long curved bridge. The alternative rejoins the existing Sterling Highway corridor at MP 51.3. The length of the alternative, including those areas that overlap with the existing highway, would be widened to meet current standards and would include the addition of west- and east-bound passing lanes. The Cooper Landing Bridge would be replaced with a new bridge that would be 78 feet wide and 670 feet long, and would accommodate 2 lanes, 1 turning lane, and 1 center lane, as well as shoulders and a pedestrian walkway on the downstream side. The existing

Schooner Bend Bridge would be replaced with a similar structure located approximately 80 feet downstream.

Due to the terrain surrounding the alternative, frequent rock and soil cuts are necessary, with the largest cut on the east side of the Cooper Creek Bridge being 1,500 feet long and 180 feet high.

1.1.3 G South Alternative

The G South Alternative uses the existing highway corridor at both ends of the project area, with a new alignment north of the Kenai River between MP 46.3 and MP 51.9. In areas where the G South Alternative occupies the footprint of the existing highway, the roadway will be widened to meet Rural Principal Arterial standards, and would include west-and eastbound passing lanes. The G South Alternative departs the existing highway at approximately MP 46 and gradually climbs to a maximum elevation of 776 feet on the hillside north of Bean Creek, where it then descends to cross Juneau Creek Canyon. The Juneau Creek Canyon Bridge would be 1,320 feet long and 62 feet wide with 2 lanes, an additional eastbound climbing lane, shoulders on both sides of the road, and a walkway on the south side of the bridge. On the west side of Juneau Creek Canyon, the alternative flattens to a new crossing of the Kenai River shortly before rejoining the existing highway corridor at MP 51.9. The new Kenai River Bridge would be approximately 490 feet long and 78 feet wide, with 2 lanes, an additional eastbound climbing lane, a center turn lane, shoulders on both sides of the road, and a walkway on the upstream (south) side of the bridge. The Schooner Bend Bridge would be replaced as part of the G South Alternative, in the same manner described for the Cooper Creek Alternative.

1.1.4 Juneau Creek Alternative

The Juneau Creek Alternative would straighten and widen the existing highway at both ends of the project area, with a new alignment north of the existing roadway between approximately MP 46.3 and 55.8. The alternative diverges from the existing highway at MP 46.3 and climbs the hillside to its crossing of the Juneau Creek Canyon with a new bridge (825 to 1,211 feet long, depending on the bridge type selected). The new Juneau Creek Canyon Bridge would be 62 feet wide with two traffic lanes, one additional westbound climbing lane, shoulders on both sides of the road, and a pathway on the downstream (south) side of the bridge. Based on the conceptual alignment and profile for this alternative, Juneau Creek is approximately 230 feet below the canyon rim and approximately 425 feet from rim to rim of the canyon at the crossing.

On the west side of the Canyon, the alignment continues to climb to its maximum elevation of approximately 300 feet above the Juneau Creek Canyon floor. The existing highway would be reconfigured to provide a T-intersection connection with the Juneau Creek Alternative at approximately MP 55.8 of the existing highway. The alignment then follows the existing highway for the remaining three miles to the end of the project.

1.2 Purpose of this Report

A traffic noise assessment was completed for the proposed Sterling Highway Milepost 45 to 60 Supplemental Draft Environmental Impact Statement (SDEIS) Project to identify existing and predicted future traffic noise levels. Noise mitigation was evaluated where future traffic noise levels were predicted to approach or exceed the Federal Highway Administration's (FHWA) and Alaska Department of Transportation and Public Facilities' (ADOT&PF) Noise Abatement Criteria (NAC).

This noise assessment is in compliance with the FHWA Traffic Noise Analysis and Abatement Policy and Guidance (1995). FHWA noise abatement regulations exist in the U.S. Code of Federal Regulations 23 CFR 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise." This assessment is also in compliance with the ADOT&PF "Noise Abatement Policy" dated March 1996, which provides guidance for implementation of the FHWA noise regulations in Alaska.

2.0 Methodology to Analyze Traffic Noise Levels and Define Traffic Noise Impacts

Noise is measured in decibels (dB) on a logarithmic scale. Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight." The A-weighted scale corresponds to the sensitivity range for human hearing. Noise levels are measured in dBA, the A-weighted sound level in decibels. When noise levels change 3 dBA or less, the change is considered to be barely perceptible to human hearing in a field situation. A 5 dBA change in noise level is clearly noticeable. A 10 dBA change in noise levels is perceived as a doubling or halving of noise loudness, and a 20 dBA change is considered a dramatic change in loudness. Table 1 shows noise levels associated with common, everyday sources, and helps the reader more fully understand the magnitude of noise levels discussed in this report.

The Leq(h) is used to analyze traffic noise levels and identify noise impacts. The Leq(h) is defined as the equivalent steady-state sound level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same period. Therefore, for the purposes of this analysis, Leq can be considered the average sound level, and Leq(h) can be considered the average sound level occurring over a one-hour period. It is representative of the overall (average) traffic-generated noise level expressed on an hourly basis.

Table 1: Common Noise Sources and Levels

Sound Pressure Level (dBA)	Typical Sources
120	Jet aircraft takeoff at 100 feet
110	Same aircraft at 400 feet
90	Motorcycle at 25 feet
80	Garbage disposal
70	City street corner
60	Conversational speech
50	Typical office
40	Living room (without TV)
30	Quiet bedroom at night

SOURCE: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980

Land uses are assigned to an activity category based on the type of activities occurring in each respective land use (e.g., picnic areas, churches, commercial land, and undeveloped land). Activity categories are then ordered based on their sensitivity to traffic noise levels. NAC are assigned to each activity category. These NAC represent the maximum traffic noise levels that allow uninterrupted use within each activity category. Table 2 lists the five land use categories included in the NAC, and the Leq(h) associated with each activity category. Traffic noise impacts are identified relative to the NAC and the ADOT&PF Noise Abatement Policy.

The FHWA definition of a traffic noise impact (23 CFR 772) contains two criteria. Only one criterion has to be met to be considered an impact. Traffic noise impacts are defined as impacts that occur when the predicted traffic noise levels:

- approach or exceed the noise abatement criteria given on Table 2 (ADOT&PF defines "approach" – see below); or,
- when the predicted traffic noise levels substantially exceed the existing noise levels (ADOT&PF defines "substantially exceed" – see below).

Table 2: Noise Abatement Criteria

Activity Category	Leq (h)	Description of Activity Category
A	57 dBA (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dBA (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 dBA (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	No Limit	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

SOURCE: Federal Highway Administration regulations 23 CFR 772.5

The ADOT&PF Noise Abatement Policy defines "approach" the NAC as within 2 dBA of the NAC. Consequently a traffic noise impact would occur when noise levels at Activity Category A land uses at 55 dBA, Activity Category B land uses at 65 dBA, Activity Category C land uses at 70 dBA, and Activity Category E land uses at 50 dBA. The Noise Policy defines a substantial increase in noise levels as a 10 dBA increase over existing noise levels.

3.0 Noise Prediction Method

Traffic noise levels estimated for this study reflect "peak hour" volume noise levels and are predicted in hourly Leq dBA. The Leq descriptor is reliable for low volume as well as high volume roadways, is simple in most instances for highway designers to work with, and is flexible in terms of permitting noise levels from different sources to be included in the analysis of the total ambient noise.

The FHWA Traffic Noise Model (TNM), version 2.5, was used to predict traffic noise levels. TNM is a three-dimensional computer model that calculates traffic noise levels using the following types of information:

- Vehicle mix and volume, using five default vehicle types;
- Vehicle speeds;
- Roadway geometry;
- Receptor locations (homes and businesses);

- Ability to model ground cover and terrain between roadway and receptors; and,
- Database of acoustical measurements.

3.1 Traffic Parameters

Table 3 shows the traffic mix determined for this project. The vehicle mix used in this analysis was estimated for July from the ADOT&PF Annual Traffic Volume Report June 2001 data "E of Quartz Creek Road" location. The FHWA 13 classification scheme (Appendix B) was used in the traffic report. Class 02 and Class 03 are grouped under "Cars;" Class 05 and Class 06 are included under the "Medium Trucks" category.

Table 3: Vehicle Mix

Roadway	% Cars	% Medium Trucks/RVs	% Heavy Trucks	% Buses	% Motorcycles	Total
Sterling Hwy	83.5	10	5	1	0.5	100

Traffic volumes used in this analysis were originally published in the HDR Traffic Analysis Memorandum (April 2003). They are based on the Peak Hour Volumes calculated for the existing and proposed roadway segments (derived from traffic data reported in the Central Region 2001 Annual Traffic Report with a 3 percent per year growth rate). Table B in Appendix B shows the traffic predictions that were used in this analysis. Traffic flow along the highway has a directional split of 67 percent eastbound and 33 percent westbound. The roadway segments are defined based on highway mileposts and station numbers as detailed in the Sterling Highway Updated Traffic Analysis (September 2005).

Table 4 shows the breakdown in traffic volumes used to model both the build and No Build alternatives. Traffic flow along the highway has a directional split of 67 percent eastbound and 33 percent westbound, which is depicted in the numbers reported.

Table 4: Vehicle Mix Used in TNM

Roadway Segment(s)*	Cars	Medium Trucks	Heavy Trucks	Buses	Motorcycles	Total
No Build Alternative						
Segment 1 EB/WB	656/323	79/39	39/19	8/4	4/2	786/387
Segments 2–5 EB/WB	689/339	83/41	41/20	8/4	4/2	825/406
Segment 6 EB/WB	676/333	81/40	41/20	8/4	4/2	810/399
Juneau Creek Alternative						
Segment 1 EB/WB	656/323	79/39	39/19	8/4	4/2	786/387
New Segs. 2–5 EB/WB	483/237	58/28	29/14	8/4	4/2	578/284
Ex. Segs. 2–5 EB/WB	206/102	25/12	12/6	3/1	1/1	247/122
Segment 6 EB/WB	676/333	81/40	41/20	8/4	4/2	810/399
G South Alternative						
Segment 1 EB/WB	656/323	79/39	39/19	8/4	4/2	786/387
Segment 2 EB/WB	689/339	83/41	41/20	8/4	4/2	825/406
New Segs. 3–5 EB/WB	483/237	58/28	29/14	8/4	4/2	578/284
Ex. Segs. 3–5 EB/WB	206/102	25/12	12/6	3/1	1/1	247/122
Segment 6 EB/WB	676/333	81/40	41/20	8/4	4/2	810/399
Cooper Creek Alternative						
Segment 1 EB/WB	656/323	79/39	39/19	8/4	4/2	786/387
Segment 2 EB/WB	689/339	83/41	41/20	8/4	4/2	825/406
New Segs. 3–4 EB/WB	483/237	58/28	29/14	5/3	3/2	578/284
Ex. Segs. 3–4 EB/WB	206/102	25/12	12/6	3/1	1/1	247/122
Segment 5 EB/WB	689/339	83/41	41/20	8/4	4/2	825/406
Segment 6 EB/WB	676/333	81/40	41/19	8/4	4/2	810/399

*Please see HDR's September 2005 Updated Traffic Report for details regarding segment locations.

This analysis used one traffic lane for each direction with a pavement width of 12 feet (No Build and existing segments used 11 feet) and the TNM default pavement type. Traffic was modeled using a speed of 55 mph.

3.2 Adjacent Land Use

Land uses throughout the project area vary from Activity Category B (residential) and Activity Category C (commercial) along the existing alignment to Activity Category D (undeveloped lands) further from the highway.

4.0 Existing Noise Levels

The location of the project area creates a unique noise environment that is reinforced by the monitoring data. After close inspection of the data, four unique noise regimes or areas were identified.

- **Area 1** includes all receptors located next to the existing roadway that are influenced mainly by traffic noise. Noise monitoring was done at these receptors (listed in Table 5) to validate the Traffic Noise Model (TNM). The TNM input file was constructed using 2001 peak hour volume traffic with the vehicle mix shown in Table 3. Results are included in Table 6. Once the model was validated, existing noise levels at receptors located near the existing roadway were determined through modeling of 2001 traffic data.
- **Area 2** includes all receptors that are near the existing roadway and near either Juneau or Cooper Creeks. Monitoring data in Table 7 (Receptor C) shows that existing noise at this location (approximately 950 ft from the existing alignment and 50 ft from Cooper Creek) was measured at 61 dBA. Receptors in these areas experience noise from the fast running creeks, and have noise levels higher than what the model would predict for roadway noise alone. Existing noise levels at receivers located in this area are assumed to be 61 dBA.
- **Area 3** includes all receptors away from the existing roadway. These receptors are not located in close enough proximity to any roadway to use the TNM to predict existing noise levels and will be assumed to be 40 dBA, as measured at Receptor A (shown in Table 7).
- **Area 4** includes all receptors away from the existing roadway and in close proximity to either Juneau Creek or Cooper Creek. These receptors are not located close enough to any roadway to use the TNM to predict existing noise levels. Monitoring data in Table 7 (Receptor B, <20 ft from Juneau Creek) shows that noise at these receptors is noticeably affected from being near the fast running Juneau Creek, as opposed to the monitored noise levels in Area 3. Existing noise levels at receivers located in this area will be assumed to be 65 dBA, as measured at Receptor B. Results of this analysis indicate that traffic noise levels of 65 dBA can be expected 50 feet from the roadway, at locations that are at least 100 feet from the nearest creek.

For presentation purposes, the following sections divides noise measurement data between validation data (Area 1) and monitoring data for Area 2, Area 3, and Area 4.

4.1 Validation Data (Area 1)

Existing traffic noise levels were measured in the field and then compared against computer predictions to verify the accuracy of the computer model. While more rigorous calibration and validation methods exist, predicted and measured levels within 3 dBA of each other indicate that the model is within an acceptable level of accuracy.

4.1.1 Field Measurement Procedure

On July 13, 15, and 20, 2001, between the hours of 11 am and 11 pm, HDR conducted noise sampling at multiple locations in the project area (see NM sites on Figure 1 in Appendix A). A separate traffic study was conducted over the July 13-15 weekend to determine vehicle counts. The monitoring activities were scheduled to occur during peak travel times, which historically have been during a July weekend. A Larson Davis Model 820 sound level meter was utilized to collect noise monitoring data for the events. The ambient temperature was in the mid fifties (°F) during the first two sampling days and 60°F on July 20. Winds were calm.

4.1.2 Field Measurement locations

Table 5 identifies the location of each of the validation sites. These are shown in Figure 1 in Appendix A.

Table 5: Validation Locations

Measurement Location (Receptor ID)	Location
NM1	Russian River Ferry Parking Lot
NM2	Upper Russian R. Campground parking lot
NM3	Russian R. Campground overflow lot
NM4	Across road from Gwin's Lodge
NM5	Upper Caribou Heights Road
NM6	Access trail below private residence
NM7	D. Young Ballfield, Cooper Landing
NM8	Kenai River boat ramp parking lot

4.1.3 Model Validation Results

The measured and predicted noise levels for each of the noise monitoring locations selected along the project corridor are presented in Table 6. The difference between the measured and predicted noise levels at each location ranged from -0.2 dBA (under predicted) to +4.5 dBA (over predicted). Comparison of the measured and predicted noise levels revealed that TNM

over predicted noise levels 75 percent of the time by an average value of 2.6 dBA. The general over prediction could be the result of a higher modeled traffic speed relative to actual conditions.

For the purposes of model validation, one decimal place is shown. For the remainder of this report and subsequent discussion, noise levels are reported as whole numbers.

Table 6: Model Validation Results

Monitoring Location	Leq(h) (dBA)		
	Measured	Predicted	Difference
NM1	55.7	56.9	1.2
NM2	41.8	43.5	1.7
NM3	61.5	61.3	-0.2
NM4	63.0	67.5	4.5
NM5	40.9	44.4	3.5
NM6	43.8	46.1	2.3
NM7	43.3	43.3	0.0
NM8	55.7	58.2	2.5

All but two of the receptors were found to be within the acceptable 3 dBA tolerance range. The discrepancy at receivers NM4 and NM5 is likely due to two factors; actual traffic was slightly less than predicted peak hour volumes, and the actual speeds were less than the posted speed utilized in prediction. Because of the good correlation between predicted and actual noise levels at the other sites, no shielding factors were utilized to adjust the model at NM4 and NM5.

4.2 Monitoring Data

Table 7 shows noise monitoring data used to support the discussion of Areas 2 through 4 discussed in Section 4.0. These locations are shown in Figure 1 in Appendix A.

Table 7: Noise Monitoring Data

Measurement Location (Receptor ID)	Location	Leq(h) (dBA)
A	West Juneau Creek Road	40
B	Resurrection Trail, Juneau Creek bridge	65
C	Opposite Cooper Creek South Campground	61

5.0 Traffic Noise Prediction

Determination of potential noise sensitive receptors for consideration under each alternative was accomplished by mapping the 50 dBA noise contour line for each alternative. Receptors within this contour line were included in the analyses. The value of 50 dBA was chosen based on the assumed existing noise level of 40 dBA for those areas not near the creeks or the highway (Area 3 as defined in Section 4.0 above). A noise impact would occur in these areas if the modeled noise level reached 10 dB above the existing level (50 dBA). Figure 2 in Appendix A shows the 50 dBA contour zones and locations of the noise sensitive receivers along the various alignments.

5.1 Existing Highway/No Build/ Cooper Creek Alternatives

Table 8 lists the noise sensitive receivers along the existing highway and the No Build and Cooper Creek alternatives. Included in the table are the monitored and computed noise levels in hourly Leq dBA for the existing highway (Year 2001[1]), No Build Alternative (Year 2025), and Cooper Creek Alternative (Year 2025), as well as their differences. The computed noise levels are compared to the NAC, and levels that approach, meet or exceed the NAC are shown in bold type. Figure 3 in Appendix A shows the location of the noise sensitive receivers along the existing highway, No Build, and Cooper Creek alternatives. Figures 3 and 4 in Appendix A show the 55 dBA (Category A Noise Impact) and 65 dBA (Category B Noise Impact) traffic noise contours delineated for the alternatives. Actual noise levels within approximately 300 feet of the Cooper Creek crossings will be higher than depicted by the contours due to contributions to the noise environment from the creek. Bold font identifies predicted traffic noise impacts.

Table 8
Noise Analysis Results – Existing Highway/No Build/Cooper Creek Alternatives

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
1(1)	Residential	63	**67**	**65**	67	-2	2	**Yes**
2(1)	Residential	59	62	61	67	-1	2	No
3(1)	Residential	52	55	55	67	0	3	No
4(1)	Residential	54	57	53	67	-4	-1	No
5(1)	Residential	53	56	52	67	-4	-1	No

[1] 2006 traffic volumes are not significantly different enough from 2001 volumes to affect noise measurements; therefore, the 2001 data was used in this analysis.

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
6(1)	Residential	58	61	56	67	-5	-2	No
7(1)	Residential	52	55	51	67	-4	-1	No
8(1)	Residential	50	53	49	67	-4	-1	No
9(1)	Residential	55	58	53	67	-5	-2	No
10(1)	Residential	57	60	55	67	-5	-2	No
11(1)	Residential	55	58	53	67	-5	-2	No
12(1)	Residential	51	54	50	67	-4	-1	No
13(1)	Residential	51	54	50	67	-4	-1	No
14(1)	Residential	63	**66**	61	67	-5	-2	No
15(1)	Residential	51	54	50	67	-4	-1	No
16(1)	Residential	61	64	59	67	-5	-2	No
17(1)	Residential	63	**66**	61	67	-5	-2	No
18(1)	Residential	57	60	55	67	-5	-2	No
19(1)	Residential	51	54	50	67	-4	-1	No
20(1)	Residential	52	55	51	67	-4	-1	No
21(1)	Residential	**65**	**68**	63	67	-5	-2	No
22(1)	Residential	52	55	51	67	-4	-1	No
23(1)	Residential	55	58	54	67	-4	-1	No
24(1)	Residential	55	58	54	67	-4	-1	No
25(1)	Residential	55	58	54	67	-4	-1	No
26(1)	Residential	55	58	53	67	-5	-2	No
27(1)	Residential	60	64	59	67	-5	-1	No
28(1)	Residential	55	58	53	67	-5	-2	No
29(1)	Residential	53	56	52	67	-4	-1	No
30(1)	Residential	52	55	51	67	-4	-1	No
31(1)	Residential	52	55	52	67	-3	0	No
32(1)	Residential	51	54	51	67	-3	0	No
33(3)	Residential	44	47	56	67	9	**12**	**YES**
34(1)	Residential	51	54	52	67	-2	1	No
35(1)	Residential	60	63	58	67	-5	-2	No
36(1)	Residential	58	61	57	67	-4	-1	No

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
37(1)	Residential	54	57	53	67	-4	-1	No
38(1)	Residential	47	51	55	67	4	8	No
39(3)	Residential	47	50	58	67	8	**11**	**YES**
40(1)	Residential	59	62	58	67	-4	-1	No
41(1)	Residential	60	63	58	67	-5	-2	No
42(1)	Residential	50	54	53	67	-1	3	No
43(1)	Residential	48	52	55	67	3	7	No
44(1)	Residential	53	57	53	67	-4	0	No
45(1)	Residential	53	56	51	67	-5	-2	No
46(1)	Residential	52	55	51	67	-4	-1	No
47(1)	Residential	53	56	51	67	-5	-2	No
48(1)	Residential	53	56	51	67	-5	-2	No
49(1)	Residential	55	58	53	67	-5	-2	No
50(1)	Residential	52	55	51	67	-4	-1	No
51(1)	Residential	54	57	53	67	-4	-1	No
52(1)	Residential	60	63	58	67	-5	-2	No
53(1)	Residential	56	59	55	67	-4	-1	No
54(1)	Residential	63	**66**	61	67	-5	-2	No
55(1)	Residential	58	61	57	67	-4	-1	No
56(1)	Residential	54	57	55	67	-2	1	No
57(1)	Residential	51	54	55	67	1	4	No
58(1)	Residential	49	53	56	67	3	7	No
59(1)	Residential	49	52	57	67	5	8	No
60(1)	Residential	49	52	57	67	5	8	No
61(1)	Residential	48	51	62	67	11	**14**	**YES**
62(1)	Residential	54	57	55	67	-2	1	No
63(1)	Residential	54	57	55	67	-2	1	No
64(1)	Residential	60	63	59	67	-4	-1	No
65(1)	Residential	62	**65**	60	67	-5	-2	No
66(1)	Residential	61	**65**	60	67	-5	-1	No
67(1)	Residential	62	**65**	60	67	-5	-2	No

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
68(1)	Residential	53	56	53	67	-3	0	No
69(1)	Residential	53	56	53	67	-3	0	No
70(1)	Residential	53	56	53	67	-3	0	No
71(1)	Residential	51	54	52	67	-2	1	No
72(1)	Residential	53	56	53	67	-3	0	No
73(1)	Residential	54	57	54	67	-3	0	No
74(1)	Residential	59	62	58	67	-4	-1	No
75(1)	Residential	56	59	56	67	-3	0	No
76(1)	Residential	59	62	58	67	-4	-1	No
77(1)	Residential	56	59	56	67	-3	0	No
78(1)	Residential	61	64	60	67	-4	-1	No
79(1)	Residential	49	52	58	67	6	9	No
80(1)	Residential	54	57	55	67	-2	1	No
81(1)	Residential	58	61	58	67	-3	0	No
82(1)	Residential	55	58	56	67	-2	1	No
83(1)	Residential	49	53	58	67	5	9	No
84(1)	Residential	52	55	59	67	4	7	No
85(1)	Residential	55	59	61	67	2	6	No
86(1)	Residential	53	56	56	67	0	3	No
87(1)	Residential	57	60	**69**	67	9	**12**	**YES**
88(1)	Residential	56	59	56	67	-3	0	No
89(1)	Residential	56	59	57	67	-2	1	No
90(1)	Residential	60	63	61	67	-2	1	No
91(1)	Residential	61	64	63	67	-1	2	No
92(1)	Residential	61	64	64	67	0	3	No
93(1)	Residential	53	56	57	67	1	4	No
94(1)	Residential	53	56	60	67	4	7	No
95(1)	Residential	51	54	56	67	2	5	No
96(1)	Residential	51	54	56	67	2	5	No
97(1)	Residential	54	57	58	67	1	4	No
98(1)	Residential	62	**66**	**69**	67	3	7	**YES**

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
99(1)	Residential	52	55	56	67	1	4	No
100(1)	Residential	54	57	63	67	6	9	No
101(1)	Residential	53	56	57	67	1	4	No
102(1)	Residential	57	60	61	67	1	4	No
103(1)	Residential	59	62	64	67	2	5	No
104(1)	Residential	58	61	63	67	2	5	No
105(1)	Residential	**65**	**68**	**70**	67	2	5	**YES**
106(1)	Residential	**69**	**72**	**74**	67	2	5	**YES**
107(1)	Commercial	67	**70**	**73**	72	3	6	**YES**
108(1)	Residential	53	56	59	67	3	6	No
109(1)	Commercial	66	69	**72**	72	3	6	**YES**
110(1)	Commercial	62	66	69	72	3	7	No
111(1)	Commercial	60	63	65	72	2	5	No
112(1)	Residential	59	62	63	67	1	4	No
113(1)	Residential	61	64	**65**	67	1	4	**YES**
114(1)	Residential	59	62	64	67	2	5	No
115(1)	Residential	58	61	62	67	1	4	No
116(1)	Residential	59	62	61	67	-1	2	No
117(1)	Residential	57	60	58	67	-2	1	No
118(1)	Residential	58	61	60	67	-1	2	No
119(1)	Residential	64	**67**	**67**	67	0	3	**Yes**
120(1)	Residential	58	61	61	67	0	3	No
121(1)	Residential	58	62	60	67	-2	2	No
122(1)	Residential	60	63	60	67	-3	0	No
123(1)	Residential	61	64	63	67	-1	2	No
124(1)	Residential	59	62	62	67	0	3	No
125(1)	Residential	60	63	62	67	-1	2	No
126(1)	Residential	60	64	64	67	0	4	No
127(1)	Residential	58	61	63	67	2	5	No
128(1)	Residential	57	60	61	67	1	4	No
URR N	Campground	48	48	48	67	0	0	No

Receptor ID (Area)	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No-Build Noise Level (dBA)	2025 Cooper Creek Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
URR E	Campground	42	45	45	67	0	3	No
URR S	Campground	39	42	42	67	0	3	No
PK SE	Campground	44	47	48	67	1	4	No
PK SW	Campground	43	46	48	67	2	5	No
PK N	Campground	40	43	46	67	3	6	No
CC N	Campground	54	58	54	67	-4	0	No
CC S	Campground	47	50	49	67	-1	2	No
RR	Campground	53	56	57	67	1	4	No

5.2 Juneau Creek/G South Alternatives

One noise sensitive receptor (Receptor 114) was identified along the alignments of the Juneau Creek and G South alternatives, as they are located in mostly undeveloped land. Table 9 lists the noise analysis results for these alternatives, which includes receptors along the existing alignment (including Receptor 114) for comparison to the existing highway and No Build Alternative. The table shows the computed noise levels in hourly Leq dBA for the existing highway (traffic volumes from year 2001), No Build Alternative (year 2025), the (year 2025) G South Alternative and year 2025 Juneau Creek Alternative. The existing highway and the year 2025 No Build Alternative results are compared to the year 2025 build alternatives results and the differences are shown. Only a small number of receptors had noise levels that differed between the Juneau Creek and G South alternatives; these receptors are highlighted. The computed noise levels are compared to the NAC. Levels that approach, meet or exceed the NAC are shown in bold type.

Land use adjacent to the Juneau Creek and G South alternatives is largely undeveloped. Noise monitoring data identified two distinct acoustical regimes along these alignments. They are defined as either away from the existing roadway or away from the existing roadway and near Juneau Creek (Areas 3 and 4 from Section 4.0). For land use planning purposes, traffic noise contours were delineated. The contours identify the distances at which predicted traffic noise levels reach NAC thresholds. Figure 3 in Appendix A shows the 55 dBA and 65 dBA traffic noise contour delineated for all of the alternatives. Actual overall noise levels within approximately 300 feet of the Juneau Creek crossings will be higher than depicted by the contours due to the contribution of noise from the creek.

Table 9: Noise Analysis Results – Juneau Creek and G South Alternatives

Receptor ID	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No Build Noise Level (dBA)	2025 Juneau Creek Noise Level (dBA)	2025 G South Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
1(1)	Residential	63	**67**	61	**65**	67	-6/-4	-2/2	**Yes**
2(1)	Residential	59	62	57	61	67	-5/-1	-2/2	No
3(1)	Residential	52	55	50	55	67	-5/0	-2/3	No
4(1)	Residential	54	57	52	52	67	-5	-2	No
5(1)	Residential	53	56	51	51	67	-5	-2	No
6(1)	Residential	58	61	56	56	67	-5	-2	No
7(1)	Residential	52	55	50	51	67	-5/-4	-2/-1	No
8(1)	Residential	50	53	48	48	67	-5	-3	No
9(1)	Residential	55	58	53	53	67	-5	-2	No
10(1)	Residential	57	60	55	55	67	-5	-2	No
11(1)	Residential	55	58	53	53	67	-5	-2	No
12(1)	Residential	51	54	49	50	67	-5/-4	-2/-1	No
13(1)	Residential	51	54	49	50	67	-5/-4	-2/-1	No
14(1)	Residential	63	**66**	61	61	67	-5	-2	No
15(1)	Residential	51	54	49	49	67	-5	-2	No
16(1)	Residential	61	64	59	59	67	-5	-2	No
17(1)	Residential	63	**66**	61	61	67	-5	-2	No
18(1)	Residential	57	60	55	55	67	-5	-2	No
19(1)	Residential	51	54	49	49	67	-5	-2	No
20(1)	Residential	52	55	50	50	67	-5	-2	No
21(1)	Residential	**65**	**68**	63	63	67	-5	-2	No
22(1)	Residential	52	55	50	50	67	-5	-2	No
23(1)	Residential	55	58	53	54	67	-5/-4	-2/-1	No
24(1)	Residential	55	58	53	53	67	-5	-2	No
25(1)	Residential	55	58	53	53	67	-5	-2	No
26(1)	Residential	55	58	53	53	67	-5	-2	No
27(1)	Residential	60	64	58	58	67	-6	-2	No
28(1)	Residential	55	58	53	53	67	-5	-2	No
29(1)	Residential	53	56	51	51	67	-5	-2	No
30(1)	Residential	52	55	49	49	67	-6	-2	No

Receptor ID	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No Build Noise Level (dBA)	2025 Juneau Creek Noise Level (dBA)	2025 G South Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
31(1)	Residential	52	55	58	58	67	3	6	No
32(1)	Residential	51	54	56	56	67	2	5	No
34(1)	Residential	51	54	49	49	67	-5	-2	No
35(1)	Residential	60	63	58	58	67	-5	-2	No
36(1)	Residential	58	61	56	56	67	-5	-2	No
37(1)	Residential	54	57	52	52	67	-5	-2	No
40(1)	Residential	59	62	57	57	67	-5	-2	No
41(1)	Residential	60	63	58	58	67	-5	-2	No
42(1)	Residential	50	54	48	48	67	-6	-2	No
44(1)	Residential	53	57	51	51	67	-6	-2	No
45(1)	Residential	53	56	51	51	67	-5	-2	No
46(1)	Residential	52	55	50	50	67	-5	-2	No
47(1)	Residential	53	56	51	51	67	-5	-2	No
48(1)	Residential	53	56	51	51	67	-5	-2	No
49(1)	Residential	55	58	53	53	67	-5	-2	No
50(1)	Residential	52	55	50	50	67	-5	-2	No
51(1)	Residential	54	57	52	52	67	-5	-2	No
52(1)	Residential	60	63	58	58	67	-5	-2	No
53(1)	Residential	56	59	54	54	67	-5	-2	No
54(1)	Residential	63	**66**	61	61	67	-5	-2	No
55(1)	Residential	58	61	56	56	67	-5	-2	No
56(1)	Residential	54	57	52	52	67	-5	-2	No
57(1)	Residential	51	54	49	49	67	-5	-2	No
62(1)	Residential	54	57	52	52	67	-5	-2	No
63(1)	Residential	54	57	52	52	67	-5	-2	No
64(1)	Residential	60	63	58	58	67	-5	-2	No
65(1)	Residential	62	**65**	60	60	67	-5	-2	No
66(1)	Residential	61	**65**	59	59	67	-6	-2	No
67(1)	Residential	62	**65**	60	60	67	-5	-2	No
68(1)	Residential	53	56	51	51	67	-5	-2	No
69(1)	Residential	53	56	51	52	67	-5	-1	No

Receptor ID	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No Build Noise Level (dBA)	2025 Juneau Creek Noise Level (dBA)	2025 G South Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
70(1)	Residential	53	56	51	51	67	-5	-2	No
71(1)	Residential	51	54	49	50	67	-5/-4	-2/-1	No
72(1)	Residential	53	56	51	51	67	-5	-2	No
73(1)	Residential	54	57	52	52	67	-5	-2	No
74(1)	Residential	59	62	57	57	67	-5	-2	No
75(1)	Residential	56	59	54	54	67	-5	-2	No
76(1)	Residential	59	62	57	57	67	-5	-2	No
77(1)	Residential	56	59	54	54	67	-5	-2	No
78(1)	Residential	61	64	59	59	67	-5	-2	No
80(1)	Residential	54	57	52	53	67	-5/-4	-2/-1	No
81(1)	Residential	58	61	56	56	67	-5	-2	No
82(1)	Residential	55	58	53	54	67	-5/-4	-2/-1	No
83(1)	Residential	49	53	49	50	67	-4/-3	0/-1	No
84(1)	Residential	52	55	51	53	67	-4/-2	-1/-2	No
85(1)	Residential	55	59	54	55	67	-5/-4	-1/0	No
86(1)	Residential	53	56	52	52	67	-4	-1	No
87(1)	Residential	57	60	55	55	67	-5	-2	No
88(1)	Residential	56	59	54	54	67	-5	-2	No
89(1)	Residential	56	59	54	54	67	-5	-2	No
90(1)	Residential	60	63	58	58	67	-5	-2	No
91(1)	Residential	61	64	59	59	67	-5	-2	No
92(1)	Residential	61	64	59	59	67	-5	-2	No
93(1)	Residential	53	56	52	53	67	-4/-3	-1/0	No
94(1)	Residential	53	56	52	53	67	-4/-3	-1/0	No
95(1)	Residential	51	54	51	51	67	-3	0	No
96(1)	Residential	51	54	51	51	67	-3	0	No
97(1)	Residential	54	57	53	53	67	-4	-1	No
98(1)	Residential	62	**66**	60	61	67	-6/-5	-2/-1	No
99(1)	Residential	52	55	52	52	67	-3	0	No
100(1)	Residential	54	57	53	53	67	-4	-1	No
101(1)	Residential	53	56	53	53	67	-3	0	No

Receptor ID	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No Build Noise Level (dBA)	2025 Juneau Creek Noise Level (dBA)	2025 G South Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
102(1)	Residential	57	60	56	56	67	-4	-1	No
103(1)	Residential	60	63	58	58	67	-5	-2	No
104(1)	Residential	58	61	57	57	67	-4	-1	No
105(1)	Residential	**65**	**68**	63	63	67	-5	-2	No
106(1)	Residential	**69**	**72**	**67**	**67**	67	-5	-2	**YES**
107(1)	Commercial	67	**70**	65	65	72	-5	-2	No
108(1)	Residential	53	56	53	53	67	-3	0	No
109(1)	Commercial	66	69	64	64	72	-5	-2	No
110(1)	Commercial	62	66	61	60	72	-5/-6	-1/-2	No
111(1)	Commercial	60	63	59	58	72	-4/-5	-1/-2	No
112(1)	Residential	59	62	58	56	67	-4/-6	-1/-2	No
113(1)	Residential	61	64	59	58	67	-5/-6	-2/-3	No
114(1)	Residential	59	62	58	57	67	-4/-5	-1/-2	No
115(1)	Residential	58	61	57	56	67	-4/-5	-1/-2	No
116(1)	Residential	59	62	57	55	67	-5/-7	-2/-4	No
117(1)	Residential	57	60	56	55	67	-4/-5	-1/-2	No
118(1)	Residential	58	61	58	58	67	-3	0	No
119(1)	Residential	64	**67**	62	61	67	-5/-6	-2/-3	No
120(1)	Residential	58	61	57	55	67	-4/-6	-1/-3	No
121(1)	Residential	58	62	58	58	67	-4	0	No
122(1)	Residential	60	63	59	58	67	-4/-5	-1/-2	No
123(1)	Residential	61	64	58	56	67	-6/-8	-3/-5	No
124(1)	Residential	59	62	62	62	67	0	3	No
125(1)	Residential	60	63	62	61	67	-1/-2	2/1	No
126(1)	Residential	60	64	59	57	67	-5/-7	-1/-3	No
127(1)	Residential	58	61	58	57	67	-3/-4	0/-1	No
128(1)	Residential	57	60	61	61	67	1	4	No
URR N	Campground	48	48	47	48	67	-1/0	-1/0	No
URR E	Campground	42	45	44	45	67	-1/0	2/3	No
URR S	Campground	39	42	42	42	67	0	3	No
PK SE	Campground	44	47	44	45	67	-3/-2	0/1	No

Receptor ID	Residential, Commercial, Campground	2001 Existing Noise Level (dBA)	2025 No Build Noise Level (dBA)	2025 Juneau Creek Noise Level (dBA)	2025 G South Noise Level (dBA)	Noise Abatement Criteria (dBA)	Change Between 2025 No Build and 2025 Build	Change Between 2001 Existing and 2025 Build	Predicted Build Impact? (Yes/No)
PK SW	Campground	43	46	43	44	67	-3/-2	0/1	No
PK N	Campground	40	43	44	44	67	-1	4	No
CC N	Campground	54	58	52	53	67	-6/-5	-2/-1	No
CC S	Campground	47	50	46	46	67	-4	-1	No
RR	Campground	53	56	55	57	67	-1/1	2/4	No

Note: Shading indicates a difference between Juneau Creak and G South alternatives for a given receptor.

6.0 Traffic Noise Impacts

Recalling Section 2.0: The FHWA defines a traffic noise impact to occur when predicted traffic noise levels approach or exceed the NAC for a given activity category (Table 2) or substantially exceed the existing noise levels.

ADOT&PF considers that an impact occurs and abatement measures will be considered for receivers if:

- Future noise levels approach or exceed 67 dBA for residences in Category B, and 72 dBA for commercial receivers in Category C. Approach is defined as two decibels less than the noise abatement criteria level for a particular activity category.
- Future build noise levels are 10 decibels or more above the existing noise levels.

Table 10 summarizes the receptors by impact type and alternative. Analysis results indicate that traffic noise impacts are predicted to occur at residences along the Sterling Highway under all of the alternatives.

Table 10: Summary of Number of Receptor Impacts

NAC Class	Receptor Types		2001 Existing	2025 No Build	2025 Juneau Creek	2025 G South	2025 Cooper Creek
B	Residential	Exceed Standard	1	4	0	0	4
		Approach or Meet Standard	2	8	1	2	3
		Substantial Increase	0	0	0	0	3
C	Commercial	Exceed Standard	0	0	0	0	1
		Approach or Meet Standard	0	1	0	0	1
		Substantial Increase	0	0	0	0	0

7.0 Noise Abatement Measures

Noise abatement measures are considered in areas where predicted traffic noise levels approach or exceed the noise abatement criteria, or when the predicted traffic noise levels substantially exceed the existing noise levels. Abatement measures are considered for these receivers consistent with the ADOT&PF guidelines.

While impacts were identified at receivers 1, 14, 17, 21, 54, 65, 66, 67, 98, 105, 106, 107 and 119 under existing conditions and in the Design Year, no noise abatement is proposed. The ADOT&PF does not have a retrofit noise barrier program (Type II).

Only one noise impact was identified under the Juneau Creek alternative and two were identified under the G South alternative: receptor 106 and receptors 1 and 106, respectively. Mitigation options are discussed below.

Impacted receptors identified under the Cooper Creek Alternative include receptors 1, 33, 39, 61, 87, 98, 105, 106, 107, 109, 113 and 119. Noise abatement was considered at these receivers. The following receptors will not be provided noise mitigation for these reasons:

- Receptors 107 and 109 are commercial properties; ADOT&PF Noise Policy does not provide mitigation for commercial properties or undeveloped lands.

- Receptors 39, 61 and 87 do not require mitigation because the properties are assumed to be acquired under the Cooper Creek Alternative, given their locations relative to the alignment footprint.

- Receptors 33 and 98 are listed as undeveloped with no structures present to require mitigation, based on information contained on the Kenai Peninsula Borough Parcel Lookup website.

This leaves Receptors 1, 105, 106, 113 and 119 to be considered for mitigation under the Cooper Creek Alternative.

7.1 Mitigation Measures

Noise abatement measures were considered for all areas of noise impact utilizing the DOT&PF Noise Policy. The following noise abatement measures were considered. Also, the reasons some abatement methods were not incorporated into the project are explained.

1. Modifying the proposed horizontal and/or vertical alignments of the roadway.

Opportunities to modify the horizontal alignment are limited by existing developments along the proposed alignments; right of way impacts would be severe. Modification of the vertical alignment would not reduce the overall noise impact of the build alternatives.

2. Traffic management measures (e.g. modify speed limits, restrict truck traffic).

Modifying the Sterling Highway speed limit would be inconsistent with the transportation function that it is being designed to serve. Restricting truck traffic would have little effect as there is only a 1 percent truck volume.

3. Construction of noise barriers along or within the right-of-way.

Construction of noise barriers within the right of way to reduce impacts is discussed in the following section.

4. Acquisition of property rights for construction of noise barriers.

Construction of a noise barrier outside of the existing right of way would not be effective for noise reduction along the Sterling Highway in this area because such a barrier would be interrupted with too many driveway openings that would compromise the effectiveness of the barrier.

5. Acquisition of property to serve as a buffer zone.

The existing development along the rights-of-way precludes the acquisition of property to maintain a buffer zone.

6. Noise insulation of public use or nonprofit institutional structures.

None of the existing development would qualify for public funding of noise insulation, as the structures are all privately owned.

Noise barriers were considered the most practical type of abatement along the highway corridor.

7.2 Discussion of Noise Barriers

A total of five receptors have been determined to require mitigation: Receptor 1 for the Cooper Creek and G South alternatives, Receptor 105, 113 and 119 for the Cooper Creek Alternative and Receptor 106 for all three build alternatives.

The ADOT&PF Noise Abatement Policy requires that ADOT&PF consider two criteria when evaluating whether noise barriers should be incorporated into a project: feasibility and reasonableness. Feasibility deals primarily with engineering considerations (e.g., can a substantial noise reduction be achieved given the conditions of a specific location? Is the ability to achieve noise reduction limited by factors such as topography, access requirements for driveways or ramps, the presence of local cross streets, maintenance needs, or other noise sources in the area?). A noise barrier must achieve a minimum of 5 decibels of attenuation (positive noise benefit) to be considered feasible.

The ADOT&PF Noise Abatement Policy includes the following statement and seven bullets: "In addition, preliminary and final design consideration should be given to the elements of safety and maintenance, and should be consistent with the following general American Association of State Highway and Transportation Officials (AASHTO) design principles:

- A noise barrier should be located beyond the recovery zone of the traveled way. The term "clear zone" is used to designate the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. The clear zone includes any shoulders or auxiliary lanes. If a noise barrier is within nine meters of the traveled way, a traffic barrier may also be warranted.

- A noise barrier should not block the line of sight between vehicles and intersecting roadways or on/off ramps.

- Protrusions on a noise barrier near a traffic lane should be avoided.

- Facings on a noise barrier that can become dislodged during an accident or facings that create excessive glare should be avoided.

- Access should be provided on all sides of the noise barrier to allow maintenance operations to take place.

- Minimum setback distances and placement of noise barriers located at on/off ramps and intersections should be based upon stopping sight distance, which depends on driver reaction time and deceleration rate.

- Maintenance factors relating to replacement of materials damaged by impact, cleaning the noise barrier, and maintenance associated with adjoining landscaping should be considered when determining feasibility."

The ADOT&PF Noise Abatement Policy states that "If a proposed noise barrier creates a safety hazard or poses potential maintenance complications, then it shall not be considered feasible".

The Noise Abatement Policy also states "Reasonableness is a more subjective criterion than feasibility. It implies that common sense and good judgment were applied in arriving at a decision. Reasonableness should be based on a number of factors, not just one criterion."

To comply with the ADOT&PF Noise Abatement Policy, the determination of reasonableness for noise barriers must be based upon a number of factors, including the following:

- Amount of noise reduction provided
- Number of people protected
- Cost of abatement
- Views of impacted residents
- Future absolute traffic noise levels
- Difference between the future traffic noise levels and the existing noise levels
- Difference between future traffic noise levels for the build and the No Build alternatives
- Amount of development that occurred before and after the initial construction of the highway
- Extent to which zoning or land use is changing
- Effectiveness of potential future land use controls implemented by local officials to prevent incompatible development

It should be noted that noise barriers could have their own negative impacts. Barriers may interfere with the passage of air, interrupt scenic views, create objectionable shadows, contribute to increased road icing, and reduce or eliminate visibility of a business from the roadway. Barriers could also create snow removal problems, cause maintenance access problems, make it difficult to maintain landscaping, create drainage problems, and provide pockets for trash and garbage to accumulate. Depending on location, noise barriers could also compromise traffic safety by reducing stopping or merging sight distance, or by reducing errant vehicle recovery room.

The ADOT&PF Noise Abatement Policy requires that a determination of economic reasonableness of noise barriers be made before a final decision to build the barriers can be rendered. The policy provides guidance for determination of the overall reasonableness of noise abatement options.

The noise policy states that the test for cost reasonableness is calculated by dividing the number of benefited residential units that receive a minimum of 5 dBA reduction in noise level into the estimated total cost of the noise barrier. If the cost is $25,000 per residence or less, the barrier is deemed economically reasonable. If this cost is exceeded, the noise abatement measures would

not be recommended, unless the residents or the local jurisdiction agree to pay the cost difference or other reasonableness criteria override the cost criteria.

HDR evaluated potential noise walls at Receptors 1, 105, 106, 113 and 119 to be considered for mitigation. These residences all have direct driveway access to Sterling Highway. Because the ability to achieve acceptable noise reduction is limited to the breaks needed in noise walls for driveways, no effective noise barriers could be modeled. Consequently, noise barriers are not feasible and not recommended for the proposed project. Appendix C contains the Noise Abatement Recommendation Checklist.

8.0 Construction Noise

It is difficult to reliably predict levels of construction noise at a particular receptor or group of receptors. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. Daily construction normally occurs during daylight hours when occasional loud noises are more tolerable. No one receptor is expected to be exposed to construction noise of long duration; therefore, extended disruption of normal activities is not anticipated. However, provisions will be included in the plans and specifications requiring the contractor to make every reasonable effort to minimize construction noise through abatement measures such as compliance with the local noise code and maintenance of muffler systems.

9.0 Conclusion

Highway traffic noise analysis of the Sterling Highway MP 45 to 60 Project revealed three existing noise impacts to residential receptors and predicted twelve residential impacts under the No Build Alternative. Evaluation of the three build alternatives yielded a total of two noise impacts to commercial receptors and ten noise impacts to residential receptors under the Cooper Creek Alternative. One noise impact was predicted under the Juneau Creek Alternative and two noise impacts were predicted under the G South Alternative. Noise abatement options for the impacted receptors were evaluated and a total of eight receptors were found to require consideration of noise abatement. No reasonable or feasible mitigation options were available for any of the noise impacts because of driveway access to the properties. Consequently, no noise abatement is recommended for the proposed project.

This recommendation is based upon preliminary design information and existing policies. Recommendations will be re-evaluated during the design phase of the project to determine whether they remain valid.

Appendix A

Figures

Appendix B

FHWA Vehicle Classification Data

Vehicle Classification Data*

Part V contains a summary of vehicle classification data that has been either manually tabulated or automatically recorded by vehicle classification counters. Data collection locations are determined by either HPMS statistical sampling requirements or highway construction projects. Data is collected over a 16-hour period by manual methods, 24 hours up to one week if portable automatic vehicle classifiers (AVCs) are used, and continuous data at some locations where permanent AVCs are installed.

The data is summarized to provide percentages of vehicles falling into categories determined by vehicle type and axle arrangement. The FHWA Vehicle Classification standard was used to categorize the vehicles into 13 classifications. The percentages of Class 2's and Class 3's may not be individually accurate due to limitations on the ability of AVC equipment to distinguish between all cars and pickup trucks based solely on axle spacing. The combined percentages of Class 1's, 2's and 3's do accurately represent the total of non commercial vehicles. Classes 4 through 13 are considered commercial type vehicles. The volume of heavy commercial vehicles in the traffic stream is of major importance for road structural and geometric design.

FHWA 13 Classifications:

Single Unit

Class 01: Motorcycles
Class 02: Automobiles, Automobiles with Trailers
Class 03: Pickup Trucks, Pickup Trucks with Trailers
Class 04: Buses (2 or 3 axles)
Class 05: Delivery Trucks, Recreational Vehicles, Dump Trucks (2 axles, 6 tires)
Class 06: Dump Trucks, Recreational Vehicles (3 axles)
Class 07: Concrete Trucks, Fuel or Propane Delivery Trucks (4 or more axles)

Single Trailer

Class 08: Tractor/Truck with Trailer (3 or 4 axles)
Class 09: Tractor/Truck with Trailer (5 axles)
Class 10: Tractor/Truck with Trailer (6 or more axles)

Multi-Trailer

Class 11: Tractor/Truck with 2 Trailers (5 axles)
Class 12: Tractor/Truck with 2 or more Trailers (6 axles)
Class 13: Tractor/Truck with 2 or more Trailers (7 or more axles)

*Excerpted from the AK DOT&PF Annual Traffic Volume Report 2001 – 2003, page V – 1.

Design Year (2025) Traffic Volume Predictions (vehicles per hour)

Roadway Segment	New Corridor Eastbound	New Corridor Westbound	Existing Corridor Eastbound	Existing Corridor Westbound
No Build Alternative				
Segment 1	NA	NA	785	387
Segment 2	NA	NA	825	406
Segment 3	NA	NA	825	406
Segment 4	NA	NA	825	406
Segment 5	NA	NA	825	406
Segment 6	NA	NA	810	399
Juneau Creek Alternative				
Segment 1	785	387	NA	NA
Segment 2	578	284	247	122
Segment 3	578	284	247	122
Segment 4	578	284	247	122
Segment 5	578	284	NA	NA
Segment 6	810	399	NA	NA
G South Alternative				
Segment 1	785	387	NA	NA
Segment 2	825	406	NA	NA
Segment 3	578	284	247	122
Segment 4	578	284	247	122
Segment 5	578	284	247	122
Segment 6	810	399	NA	NA
Cooper Creek Alternative				
Segment 1	785	387	NA	NA
Segment 2	825	406	NA	NA
Segment 3	578	284	247	122
Segment 4	578	284	247	122
Segment 5	825	406	NA	NA
Segment 6	810	399	NA	NA

Appendix C

Abatement Recommendation Checklist

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NOISE ABATEMENT RECOMMENDATION CHECKLIST

Project Name: Sterling Highway MP 45-60 Project
Preparer: HDR Alaska, Inc.
Project No: STP-F-021-2(15)/53014
Receiver Name/Description

1. Does a noise impact exist or is one predicted to occur in the Design Year?
   Yes __**X**___ No_____
   If no, then noise abatement is not recommended. Proceed to decision segment of form.
2. Is the receiver a use typically defined within Land Use Category A and/or B in the FHWA noise abatement criteria?
   Yes ___**X**__ No_____
   If no, then noise abatement is not recommended. Proceed to decision segment of form.
3. Is the receiver in an area of development where rapidly changing land use is occurring?
   Yes __**X**___ No_____
   If yes, then noise abatement is not recommended. **Proceed to decision segment of form.**
4. Can effective noise barriers be constructed which provide a minimum 5 dBA reduction in noise levels?
   Yes_____ **No** __**X**___
   If no, abatement measures are not feasible and are not recommended at this site. **Proceed to decision segment of this form.**
5. Can effective noise barriers be constructed without creating a safety hazard to users and residents, and interfering with operations and maintenance of the highway facility?
   Yes_____ **No**___**X**___
   If no, abatement measures are not feasible and are not recommended at this site. **Proceed to decision segment of this form.** If yes, then continue filling in the form to determine the reasonableness of abatement measures.

REASONABLENESS DETERMINATION

Reasonableness Factors	YES	NO
(A) Cost per Benefited Residence	_____	_____
Total Barrier Cost -- #of benefited residences > $25,000	_____	_____
If yes, go to I below		
If no, go to II and continue analysis		
I. Severe Noise Impact		
(a) noise increase at least 15 dBA	_____	_____
(b) build at least 5dBA > no build	_____	_____
If either (a) or (b) is yes, go to II, continue analysis. If not, noise abatement measures are not considered reasonable, go to decision		
II. Additional Factors	_____	_____
(B) Residents' Desires	_____	_____
(C) Development vs. Timing	_____	_____

(D) Development existence	_____	_____
(E) Build level 65 dBA	_____	_____
(F) Build level 5 dBA greater than existing	_____	_____
(G) Build level 3 dBA greater than no build	_____	_____

ADDITIONAL CONCERNS:

DECISION

Are Abatement Measures feasible? Yes_____ **No___X__**

Are Abatement Measures reasonable? Yes_____ No_____

REASONS FOR DECISION

No noise barriers are recommended anywhere within the project area at Category B land uses. Due to the numerous breaks that would be needed in noise barriers for driveway access to properties, effective noise barriers could not be provided. No noise abatement is recommended at Category C or D Land Use Activity (commercial or undeveloped) because it is ADOT&PF policy not to provide abatement for these uses.